DIRECTIONS

Std. 1367

ASSEMBLY AND OPERATION OF NO. 2111 AND NO. 2112 LAMP AND SCALE READING DEVICE

LEEDS NORTHRUP
PHILADELPHIA 44, PA.

ASSEMBLY AND OPERATION OF NO. 2111 AND NO. 2112 LAMP AND SCALE READING DEVICE

1. GENERAL DATA

The No. 2111 and No. 2112 Lamp and Scale Reading Devices are compact, convenient assemblies for use in the vertical projection method. The No. 2111 Lamp and Scale Reading Device is designed for use on the No. 2239 wall-type galvanometer. The No. 2112 assembly consists of the No. 2111 assembly plus a counterweight and mounting band which make it possible to mount the lamp and scale on the No. 2500, 2284, 2285 and 2290 table-type galvanometers.

Handle the lamp and scale with care while unpacking and make a check against the shipping list to be certain that no parts are discarded with the packing material.

The No. 2111 assembly includes the following:

1 support (with mounting screw) on which lamp, lens and square mirror are mounted during shipment
1 white cardboard scale
1 long mirror
1 lens of 1/3 meter focal length
1 wiring connection with socket for lamp

The No. 2112 assembly includes, in addition to the foregoing:

1 iron counterweight with mounting screw
1 mounting band with screw

Before assembling, wipe off all parts with a soft, clean cloth or piece of tissue paper.

The main support, designed for mounting on the front of the galvanometer, contains the lamp, cross-hair, focusing lens, and square mirror 1, Fig. 1 or Fig. 2, for reflecting the image from the galvanometer mirror and lens to the long mirror.

The white cardboard scale has a length of 50 centimeters, marked 25-0-25, with one millimeter divisions; the figures are printed in red on one side of zero and black on the other side to indicate direction as well as quantity of deflection.

The long mirror is to be mounted by means of the screw and curved spring. It reflects the image from the small square mirror directly to the scale.

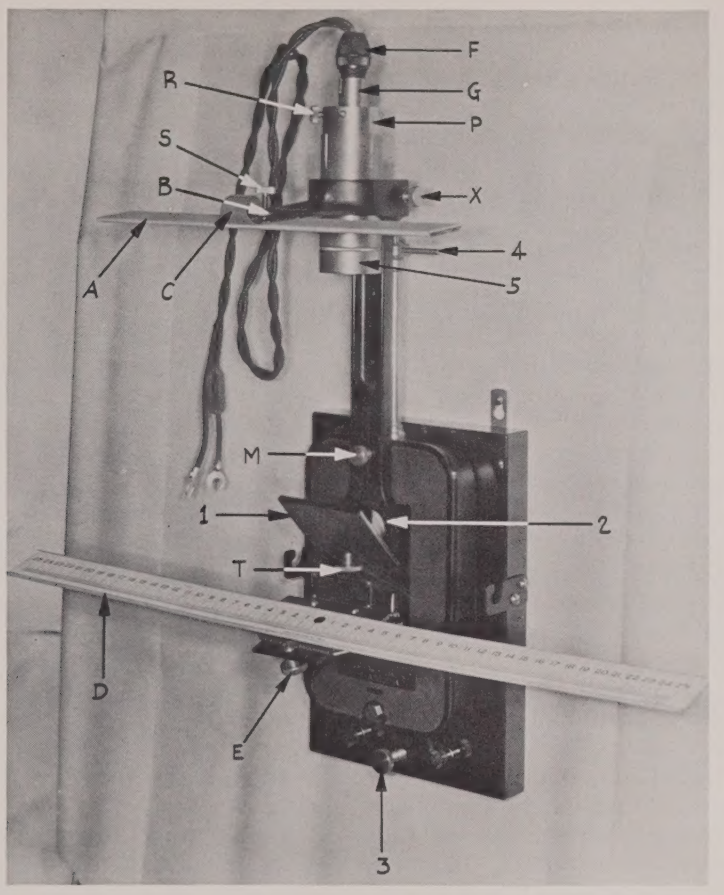

Fig. 1

The metal mounting band of the No. 2112 assembly is furnished for attaching the reading device to the Nos. 2500, 2284, 2285 and 2290 table-type galvanometers. The cast iron weight of the No. 2112 assembly is furnished to counterbalance the weight of the lamp and scale and to avoid the possibility of the instrument's tipping over.

These lamp and scale devices are designed for use in making null measurements. For this reason the image will be sharpest at zero; deflections of more than 10 centimeters will lack definition. However, as long as the galvanometer is used as a null instrument, this will present no difficulty, since the deflection is used only to give an indication of the magnitude and direction of the unbalance.

The L&N No. 2544 Lamp, Mazda No. 1130, is specially designed for use with this reading device. Replacement lamps can be secured at any auto supply store. The lamp operates on 5 or 6 volts and can be supplied directly by a battery or from a commercial source of current by using

one of the following attachments:

L&N No. 10609 Transformer for 115 or 230 volts to 5 volts, 60 cycles a-c
L&N No. 10610 Transformer for 115 or 230 volts to 5 volts, 25 cycles a-c
L&N No. 10766 Resistance Unit for 110 volts d-c

2. ASSEMBLY

Assemble the reading device as shown in Fig. 1 or Fig. 2.

Mount the lens of 1/3 meter focal length in the holder under the window plate at 2, Fig. 1, or for the No. 2112, in the lens support on the front of the instrument at 2, Fig. 2.

Mount the long mirror A on arm B with the face of the mirror downwards and with the curved spring C over the end of the arm.

Slide scale D into the scale support from the left, until the teeth of the rack on the scale-mounting mesh with the teeth of the pinion on thumb-screw E, and the scale zero is opposite the thumb-screw.

NOTE: If the reading device is to be used with a table-type galvanometer, Fig. 2, attach the counterweight 6, Fig. 3, to the bottom of the galvanometer with screw 7, (first making sure that the coil is clamped to prevent breaking of the suspension). Attach the band H, Fig. 2, to the galvanometer as shown in the photograph. Remove the mounting screws K, Fig. 2, insert them through the slot in the reading device, and mount reading device as shown. Unclamp the coil after the reading device is assembled and mounted. When the galvanometer is mounted on a No. 2147 Bracket, the front leveling screws in the galvanometer base should be seated in the front depressions in the bracket base.

If the reading device is to be used with a wall-type galvanometer, remove hex screw from top of front plate and replace it with screw M, Fig. 1 (furnished with the assembly), inserting it through the slot in the casting.

Insert the plug into lamp socket G, Figs. 1 and 2, and connect the tagged leads to the secondary terminals of the transformer. If a resistance unit is used, connect it in series with the lamp.

3. ADJUSTMENT

Loosen screw M, Fig. 1, or screws K, Fig. 2, and adjust the lamp and scale unit by moving the entire unit up or down until the center of the square mirror 1 is approximately opposite the center of the galvanometer mirror. Tighten the clamp screws M, Fig. 1, or K, Fig. 2.

Adjust the square mirror 1 by means of thumb screw T so that the light beam is reflected in mirror A. To do this attach a short piece of

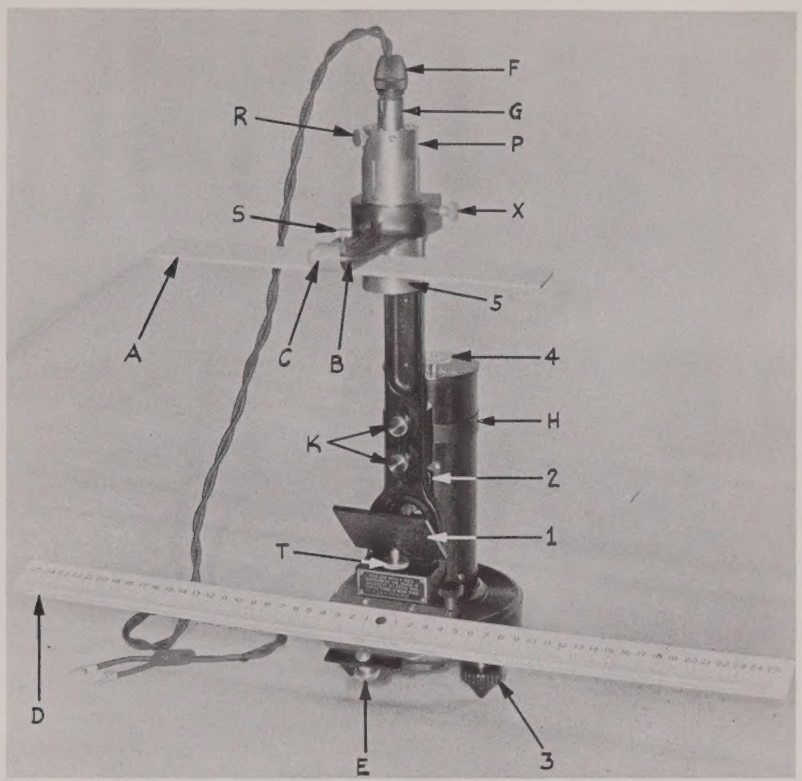

Fig. 2

wire to each binding post on the galvanometer. Touch the wires with the fingers to start the galvanometer mirror swinging. Then, looking down into the mirror 1 over the rear edge of mirror A, turn screw T until the light is reflected directly into the eyes as the mirror swings. Next, look down into mirror 1 over the front edge of mirror A and turn screw T to the left until the same result is obtained. Then, at a point between these two positions of mirror 1, the light beam will be reflected in mirror A. Turn screw T to the right until this point is reached.

Adjust mirror A by means of screw S so that the light beam falls on scale D. Mirror 1 may have to be readjusted slightly.

The target is properly focused by means of successive adjustments of the tube containing the lens in casing 5, and the lamp holder G and cover P in casing 5.

If the index line in the light circle is not parallel to the scale divisions at the center of the scale, it may be adjusted by loosening the large setscrew X at the top of the casting and turning the lens socket until the line is vertical.

If a vertical motion of the light spot accompanies the horizontal

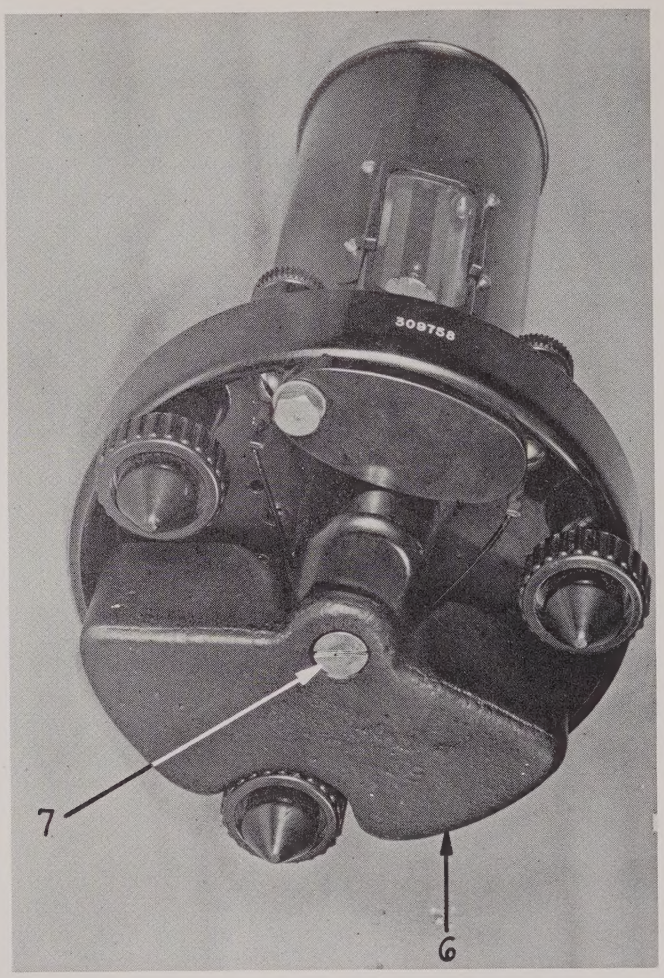

Fig. 3

motion, a leveling adjustment should be made.

To adjust the level and zero positions of the wall-type galvanometer, Fig. 1, adjust screw 3 until the vertical axis of the galvanometer coil is parallel to the sides of the window plate. Loosen the lower screw on the cross arm 4 (the upper screw being tight), and turn the cross arm to bring the index to zero on the scale. Clamp this adjustment by tightening the lower screw. For further zero shift adjustment, see the directions which were supplied with the galvanometer.

To adjust the level and zero positions of the table-type galvanometer, Fig. 2, adjust the three screws 3 in the base of the galvanometer, keeping in mind the fact that turning a screw in a clockwise direction will cause the coil to move away from the screw, and vice versa. The leveling adjustment is completed when the galvanometer coil swings vertically

between the pole faces and does not strike the pole pieces or the core during a full deflection to either side. Place the knurled knob 4 on the ZERO ADJUSTOR rod (marked on the top of the case). Turning this rod in one direction will cause the coil to turn in the same direction. Adjust the knob until the index line is at zero on the scale. For further zero shift adjustment, see the directions which were supplied with the galvanometer.

For small deviations from zero, center the index line on zero by means of thumb screw E.

4. READINGS

The scale reading is indicated by a round spot of light. When the proper focusing adjustment has been made, the cross-hair appears as a dark index-line in the center of the light spot. If the bridge or potentiometer circuit is adjusted until the galvanometer reading is at zero, then no current is flowing and the circuit is balanced.

Since the scale reading is made at a distance of 1/3 meter from the galvanometer mirror the sensitivity obtained will be 1/3 of the sensitivity noted on the tag attached to the galvanometer. (The sensitivity marked on the tag is expressed as the sensitivity for a distance of one meter.)

5. LAMP REPLACEMENT

To replace the lamp, disconnect the wires at the current source. Pull out the tube P, Figs. 1 and 2; loosen screw R and lower the lamp holder G until the bulb can be reached. Remove the lamp and replace it with the new one. Raise the lamp and socket to their former position. Tighten screw R; replace tube P in its original position.

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